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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/016,437	12/10/2001	Nader Dutta	594-25576-US	5333

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WesternGeco L.L.C.
Jeffrey E. Griffin
10001 Richmond Avenue
HOUSTON, TX 77042-4299

EXAMINER	
JONES, HUGH M	
ART UNIT	PAPER NUMBER
2128	

NOTIFICATION DATE	DELIVERY MODE
08/21/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

lgoldsmith@slb.com
aperalta2@slb.com
rsmith31@slb.com

Office Action Summary	Application No.	Applicant(s)
	10/016,437	DUTTA ET AL.
	Examiner	Art Unit
	Hugh Jones	2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 June 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,12-15,17-27 and 29-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8, 12-15, 17-27, 29-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-8, 12-15, 17-27, 29-34 of U. S. Application 10/016,437, filed 12/10/2001, are presented for examination. Applicants are thanked for their response.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-8, 17, 20, 23-27, 29-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mallick (11/2000; "Hybrid seismic inversion: A reconnaissance tool for deepwater exploration") in view of Huffman **(6,694,261)**). Claims 12-15, 18-19, 21-22 are not examined.

5 Mallick discloses all limitations, as subsequently discussed, but does not expressly disclose the application of the technique to Shallow Water Flow (SWF).

6. Huffman discloses a method for identification of shallow water flow hazards using seismic data (see title), using the same types of techniques.

7. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the Mallick teaching to include the Huffman teaching because Huffman disclose in the "background of the art" that there is a need to identify SWF prior to drilling a borehole.

8. The phrase "…to provide an elastic earth … and the stratigraphic analysis…" appears to be redundant to the preceding recitation.

9. Specifically, the combination discloses:

1. (Currently Amended)
A method for determining shallow water flow risk
comprising: developing a geologic model of shallow water flow risk areas; performing a stratigraphic analysis on only P-wave seismic data to determine a control location within the only P-wave seismic data (M: Page 1230 (col. 2-3): The **elastic earth models** **(consisting of *P*-wave velocity, density, and Poisson's ratio)** obtained at each location of the prospect where **prestack GA inversion** was run can be used as background low-frequency impedance trends for poststack inversion and can create a hybrid inversion scheme.);
applying a pre-stack full waveform inversion on only the P-wave seismic data at the control location to provide an elastic model, wherein the elastic model comprises pressure-wave velocity and shear-wave velocity (M: Page 1230 (col. 1):

> This hybrid methodology first runs prestack genetic algorithm (GA) inversion at discrete locations over the entire data volume. Detailed elastic models obtained from prestack inversion then constrain background trends for poststack inversion.
>
> Page 1230 (col. 2-3): The **elastic earth models** **(consisting of *P*-wave velocity, density, and Poisson's ratio)** obtained at each location of the prospect where **prestack GA inversion** was run can be used as background low-frequency impedance trends for poststack inversion and can create a hybrid inversion scheme.
>
> Page 1233: Comparison of Figures 1b and 1c demonstrates the need for fine discretization of the earth models in *prestack inversion*. *Our inversion uses a full wave-equation approach* that takes all primary, mode-converted, and interbed multiple reflections into account. To correctly model all stratigraphic details of the subsurface, inclusion of mode conversions and interbed multiple reflections is necessary. In addition, to correctly model thin-bed tuning effects due to these mode conversions and multiple reflections, it is necessary to discretize the earth model to one-fourth of the dominant wavelength of the input seismic data.
>
> Page 1234: It is also important to note that the full waveform prestack inversion plays a very important role in the hybrid inversion. First of all, it is prestack inversion that provides the low-frequency *P*- and *S*-wave

impedance trends for our hybrid inversion. When well data (normally used to define low-frequency impedance trends) are not available, prestack inversion is the only way to obtain this information.

Page 1235

In addition to providing low-frequency trends, prestack inversion can also verify the validity of the poststack inversion. Poststack inversion assumes that every event on seismic data is a primary reflection. If seismic trace amplitudes are contaminated by interference effects, poststack inversion will be ambiguous. **Prestack inversion, on the other hand, uses a full wave-equation approach** that correctly handles such interference effects.);

Page 230: The elastic earth models (consisting of P-wave velocity, density, and Poisson's ratio) obtained at each location of the prospect where prestack GAinversion was run can be used as background low-frequency impedance trends for poststack inversion and can create a hybrid inversion scheme. Two such hybrid schemes are fully described by Mallick et al. (1999) and summarized below..

Mallick then discloses (pp. 230-231):... compute P- and S-wave impedances from prestack data and use standard AVO processing to generate AVO intercept and AVO gradient volumes. Next, we assume a background P- to S-wave velocity ratio, and combine the AVO intercept and gradient volumes to generate a pseudo S-wave volume. A derivation for computing pseudo S-wave data from the AVO intercept and gradient is presented in Appendix A. Finally, we run poststack inversions on AVO intercept and pseudo S-wave volumes, using P- and S-wave impedance values from prestack inversion at discrete locations as background impedance trends. Once P- and S-wave impedances from these poststack inversions are obtained, we can compute Poisson's ratio according to Appendix B.

Note from above " Next, we assume a background P- to S-wave velocity ratio, and combine the AVO intercept and gradient volumes to generate a pseudo S-wave volume". The s wave data is derived from the P data via the assumed ratio. Thus, the section cited in the rejection is only directed to P wave data.

computing a ratio between the pressure-wave velocity and the shear-wave velocity; and

identifying shallow water flow risk areas using the pressure-wave velocity to the shear-wave velocity ratio. (M: Page 1230 (col. 2-3): The **elastic earth models** (**consisting of *P*-wave velocity, density, and Poisson's ratio**) obtained at each location of the prospect where **prestack GA inversion** was run can be used as background low-frequency impedance trends for poststack inversion and can create a hybrid inversion scheme.; H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49)

Re ratio: Huffman (US 6,694,261) :

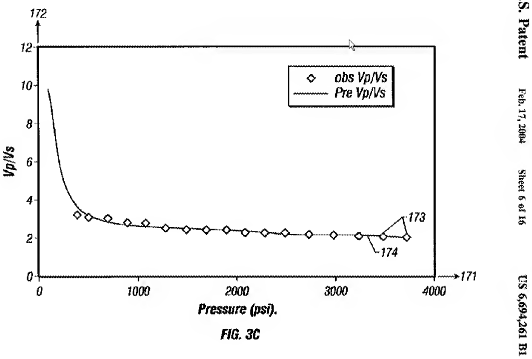
172
12
10
8
6
4
2
0
Vp/Vs
obs Vp/Vs
Pre Vp/Vs
173
174
171
0
1000
2000
3000
4000
Pressure (psi).
U.S. Patent
Feb. 17, 2004
Sheet 6 of 16
US 6,694,261 B1

FIG. 3C

It is of particular interest to note that the compressional velocities for the data of FIGS. 3*b* and 3*d* the sands shows relatively little dependence upon the effective stress, and at low stresses, is approximately 2000 meters per second. The Vp/Vs ratio, on the other hand, increases from a value of about 2.5 at 1000 psi to over 6.0 at 20 psi.

An effective stress of 1000 psi corresponds roughly to a subsea depth of approximately 2000 feet for normally pressured sediments. This is within the range where abnormally pressured SWF sands have been encountered in deepwater drilling. What FIGS. 3*a*–3*d* show is that if such a sand is buried and the fluid pressure builds up due to differential compaction or structural geopressuring, there is a small change in the compressional wave velocity and a large change in the shear velocity of the sand. This difference in shear wave velocity will manifest itself as a time delay, or "static" shift in the seismic data that will make the abnormally-pressured SWF sand appear thicker in time on the shear wave data due to the low shear velocities. Additionally, a sand with a shear velocity of 700 to 800 m/s would have a relatively small difference in shear wave impedance with an overlying clay or silt sediments whereas a sand with a shear velocity of 300 m/s or less would have a much larger difference in shear wave impedance with overlying sediments. As would be well known to those versed in the art, such a difference in shear wave impedance should be detectable by suitable seismic methods. What is important for the present invention is that the abnormal pressure in a sand body will produce a small change in compressional velocity and impedance and a large change in shear velocity and impedance: the exact magnitude of the change and the mechanism that causes the change is relatively unimportant.

Col. 6:

2. (Original) The method of claim 1, wherein the seismic data comprises seismic data selected from the list consisting of one-dimensional seismic data, two-dimensional seismic data, and three-dimensional seismic data (M: fig. 1-2, for example ; H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49).

3. (Original) The method of claim 1, wherein the elastic model further comprises attributes selected from the list consisting of density, Poisson's ratio, and Lame elastic parameters.

(M: Page 1230 (col. 2-3): The **elastic earth models** (**consisting of *P*-wave velocity, density, and Poisson's ratio**) obtained at each location of the prospect where **prestack GA inversion** was run can be used as background low-frequency impedance trends for poststack inversion and can create a hybrid inversion scheme; H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49; fig. 13)

4. (Original) The method of claim 1, further comprising processing the seismic data to enhance its stratigraphic resolution.

(H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49; M: pg. 1234, col. 1, for example)

5. (Original) The method of claim 4, wherein the processing the seismic data comprises sub-sampling the seismic data to less than two millisecond intervals.

(H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49; M: fig. 12)

6. (Original) The method of claim 4, wherein the processing the seismic data comprises using an algorithm with an amplitude preserving flow.

(H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49); Mallick discloses amplitude preserving techniques in Appendix A. Also see (page 1233): Comparison of Figures 1b and 1c demonstrates the need for fine discretization of the earth models in *prestack inversion*. *Our inversion uses a full wave-equation approach* that takes all primary, mode-converted, and interbed multiple reflections into account. To correctly model all stratigraphic details of the subsurface, inclusion of mode conversions and interbed multiple reflections is necessary. In addition, to correctly model thin-bed tuning effects due to these mode conversions and multiple reflections, it is necessary to discretize the earth model to one-fourth of the dominant wavelength of the input seismic data.

7. (Original) The method of claim 4, wherein the processing the seismic data comprises using an algorithm selected from the list consisting of a pre-stack time migration, accurate velocity normal-moveout correction, and noise removal algorithms.

(M: Page 1233: Comparison of Figures 1b and 1c demonstrates the need for fine discretization of the earth models in *prestack inversion*. *Our inversion uses a full wave-equation approach* that takes all primary, mode-converted, and interbed multiple reflections into account. To correctly model all stratigraphic details of the subsurface, inclusion of mode conversions and interbed multiple reflections is necessary. In addition, to correctly model thin-bed tuning effects due to these mode conversions and multiple reflections, it is necessary to discretize the earth model to one-fourth of the dominant wavelength of the input seismic data. Page 1234: It is also important to note that the full waveform prestack inversion plays a very important role in the hybrid inversion. First of all, it is prestack inversion that provides the low-frequency *P*- and *S*-wave impedance trends for our hybrid inversion. When well data (normally used to define low-frequency impedance trends) are not available, prestack inversion is the only way to obtain this information.; Page 1235: In addition to providing low-frequency trends, prestack inversion can also verify the validity of the poststack inversion. Poststack inversion assumes that every event on seismic data is a primary reflection. If seismic trace amplitudes are contaminated by interference effects, poststack inversion will be ambiguous. **Prestack inversion, on the other hand, uses a full wave-equation approach** that correctly handles such interference effects.); H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49)

8. The method of claim 1, wherein the control location comprises a plurality of control locations.
(M: Page 1230, col. 1: This hybrid methodology first runs prestack genetic algorithm (GA) inversion at discrete locations over the entire data volume. Detailed elastic models obtained from prestack inversion then constrain background trends for poststack inversion. Page 1230 (col. 2-3): The **elastic earth models** (**consisting of *P*-wave velocity, density, and Poisson's ratio**) obtained at each location of the prospect where **prestack GA inversion** was run can be used as background low-frequency impedance trends for poststack inversion and can create a hybrid inversion scheme.; H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49)

12. (Original) The method of claim 11, wherein performing the stratigraphic analysis comprises identifying the control location by using the geologic model to identify a geologic feature selected from this list consisting of faults, blow-outs, bioherms, chaotic facies, cones, diapers, domes, gas vents, gas mounds, mud volcanoes, popckmarks, scarps, slumps, channels, slope fan deposition, and bottom simulator reflectors. (intended use; M: pg. 1236: If so, they may correspond to
shallow gas pockets and can cause significant drilling hazards.; H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49).

13. (Original) The method of claim 9, wherein selecting the control location within the seismic data further comprises evaluating the seismic attributes of the seismic data. (M: Page 1230 (col. 1):

> This hybrid methodology first runs prestack genetic algorithm (GA) inversion at discrete locations over the entire data volume. Detailed elastic models obtained from prestack inversion then constrain background trends for poststack inversion.
>
> Page 1230 (col. 2-3): The **elastic earth models** (**consisting of *P*-wave velocity, density, and Poisson's ratio**) obtained at each location of the prospect where **prestack GA inversion** was run can be used as background low-frequency impedance trends for poststack inversion and can create a hybrid inversion scheme.
>
> Page 1233: Comparison of Figures 1b and 1c demonstrates the need for fine discretization of the earth models in *prestack inversion*. *Our inversion uses a full wave-equation approach* that takes all primary, mode-converted, and interbed multiple reflections into account. To correctly model all stratigraphic details of the subsurface, inclusion of mode conversions and interbed multiple reflections is necessary. In addition, to correctly model thin-bed tuning effects due to these mode conversions and multiple reflections, it is necessary to discretize the earth model to one-fourth of the dominant wavelength of the input seismic data.
>
> Page 1234: It is also important to note that the full waveform prestack inversion plays a very important role in the hybrid inversion. First of all, it is prestack inversion that provides the low-frequency *P*- and *S*-wave impedance trends for our hybrid inversion. When well data (normally used to define low-frequency impedance trends) are not available, prestack inversion is the only way to obtain this information.;

H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49)

14. (Original) The method of claim 13, wherein evaluating the seismic attributes comprises using amplitude-variation-with-offset attributes, comprising intercept and gradient.

(M: appendix A; ; H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49)

15. (Previously Presented) The method of claim 13, wherein evaluating the seismic attributes comprises evaluating polarity changes in reflection coefficient.; H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49)

17. (Original) The method of claim 1, wherein the pre-stack waveform inversion comprises applying a genetic algorithm. (M: Page 1230 (col. 2-3): The **elastic earth models** (**consisting of *P*-wave velocity, density, and Poisson's ratio**) obtained at each location of the prospect where **prestack GA inversion** was run can be used as background low-frequency impedance trends for poststack inversion and can create a hybrid inversion scheme; H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49)

20. (Currently Amended)

The method of claim 18, wherein applying the pre- stack full waveform inversion comprises using an exact wave equation having mode conversions and interbed multiple reflections. (M: pg. 1233 (col. 1-2): Comparison of Figures 1b and 1c demonstrates the need for fine discretization of the earth models in prestack inversion. Our inversion uses a full wave-equation approach that takes all primary, mode-converted, and interbed multiple reflections into account. To correctly model all stratigraphic details of the subsurface, inclusion of mode conversions and interbed multiple reflections is necessary.)

23. (Original) The method of claim 1, further comprising applying a post-stack inversion on the seismic data using the elastic model to determine the shallow water flow risk over a 3D volume.

(H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49).

24. (Original) The method of claim 1, wherein the post-stack inversion is performed using an AVO intercept and a pseudo shear-wave data volume.

(M: appendix A; H2: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49).

25. (Original) The method of claim 1, wherein shallow water flow risk is identified when the pressure-wave velocity compared to the shear-wave velocity is between approximately 3.5 and approximately 7. (H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49)

26. A computerized method for determining shallow water flow risk using seismic data comprising:

processing the P-wave seismic data to enhance its stratigraphic resolution using towed hydrophones (insignificant post solution data collection which does not affect the method itself – regardless, a skilled artisan would use the towed sensors as needed);

selecting a control location comprising:
performing a stratigraphic analysis on the P-wave seismic data (see claim 1); and
evaluating the seismic attributes of the P wave seismic data (see claim 1);
applying a pre-stack waveform inversion on the seismic data at a selected control location to provide an elastic model, wherein the elastic model comprises pressure- wave velocity and shear-wave velocity (see claim 1);
applying a post-stack inversion on the P wave seismic data using the elastic model (see claim 1); and to map a ratio between the P-wave velocity and the S-wave velocity in a three dimensional (3D) volume (see claim 1); and
determining the shallow water flow risk using the ratio between the P-wave velocity and the S-wave velocity in the 3D volume. (H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49)

27. (Original) The method of claim 26, wherein the pre-stack waveform inversion comprises using a genetic algorithm comprising:
generating a plurality of elastic earth models;
generating pre-stack synthetic seismograms for the elastic earth models;
matching the generated seismograms with the seismic data;
generating a fitness for the elastic earth models;
genetically reproducing the elastic earth models using the fitness for the elastic earth models; and
determining convergence of the reproduced elastic earth models to select the elastic model.

(; H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49; recitations of "to provide" do not further limit the preceding recitations).

29. (New) A method for determining a shallow water flow risk area, comprising:
developing a geologic model of the shallow water flow risk area;
performing a stratigraphic analysis on only P-wave seismic data to determine a
control location within the P-wave seismic data;
applying a pre-stack waveform inversion on the P-wave seismic data at the control location to provide P-wave velocity (Vp) and Poisson's ratio;
computing for S-wave velocity (Vs) using the P-wave velocity (Vp) and the Poisson's ratio;
computing for a ratio between the P-wave velocity (Vp) and the S-wave velocity (Vs); and
identifying the shallow water flow risk area using the ratio (Vp/Vs).
(limitations have already been discussed).

30. (New) The method of claim 29, wherein the S-wave velocity (Vs) is computed using
the recited formula. (M: Page 1230 (col. 2-3): The **elastic earth models** (**consisting of *P*-wave velocity, density, and Poisson's ratio**) obtained at each location of the prospect where **prestack GA inversion** was run can be used as

background low-frequency impedance trends for poststack inversion and can create a hybrid inversion scheme.; H: col. 6, lines 6-54, col, 6; col. 11, line 60 to col. 12, line 49)

31. (New) The method of claim 1, wherein the P-wave seismic data are a single component P-wave seismic data (doesn't further limit the method; regardless, M: pg. 1233 (col. 1-2): Comparison of Figures 1b and 1c demonstrates the need for fine discretization of the earth models in prestack inversion. Our inversion uses a full wave-equation approach that takes all primary, mode-converted, and interbed multiple reflections into account. To correctly model all stratigraphic details of the subsurface, inclusion of mode conversions and interbed multiple reflections is necessary.).

32. (New) The method of claim 1, wherein the S-wave velocity is obtained indirectly from an amplitude variation with offset (AVO) analysis of the P-wave seismic data (M: pp. 1230-1231: compute *P*- and *S*-wave impedances from prestack data and use standard AVO processing to generate AVO intercept and AVO gradient volumes. Next, we assume a background *P*- to *S*-wave velocity ratio, and combine the AVO intercept and gradient volumes to generate a pseudo *S*-wave volume. A derivation for computing pseudo *S*-wave data from the AVO intercept and gradient is presented in Appendix A; appendix A).

As for claims 33-34,

Mallick then discloses (pp. 230-231):... compute P- and S-wave impedances from prestack data and use standard AVO processing to generate AVO intercept and AVO gradient volumes. Next, we assume a background P- to S-wave velocity ratio, and combine the AVO intercept and gradient volumes to generate a pseudo S-wave volume. A derivation for computing pseudo S-wave data from the AVO intercept and gradient is presented in Appendix A. Finally, we run poststack inversions on AVO intercept and pseudo S-wave volumes, using P- and S-wave impedance values from prestack inversion at discrete locations as background impedance trends. Once P- and S-wave impedances from these poststack inversions are obtained, we can compute Poisson's ratio according to Appendix B.

Note from above " Next, we assume a background P- to S-wave velocity ratio, and combine the AVO intercept and gradient volumes to generate a pseudo S-wave volume". The s wave data is derived from the P data via the assumed ratio. Thus, the section cited in the rejection is only directed to P wave data.

Response to Arguments

10. Applicant's arguments, filed 6/1/2009 have been carefully considered, but are not persuasive.

11. The argument on page 11 re velocity ratio relies upon text taken out of context.

Mallick then discloses (pp. 230-231):... compute P- and S-wave impedances from prestack data and use standard AVO processing to generate AVO intercept and AVO gradient volumes. Next, we assume a background P- to S-wave velocity ratio, and combine the AVO intercept and gradient volumes to generate a pseudo S-wave volume. A derivation for computing pseudo S-wave data from the AVO intercept and gradient is presented in Appendix A. Finally, we run poststack inversions on AVO intercept and pseudo S-wave volumes, using P- and S-wave impedance values from prestack inversion at discrete locations as background impedance trends. Once P- and S-wave impedances from these poststack inversions are obtained, we can compute Poisson's ratio according to Appendix B.

Note from above " Next, we assume a background P- to S-wave velocity ratio, and combine the AVO intercept and gradient volumes to generate a pseudo S-wave volume". The s wave data is derived from the P data via the assumed ratio. Thus, the section cited in the rejection is only directed to P wave data.

12. The rest of the arguments appear to have been presented previously and thus have been addressed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hugh Jones whose telephone number is (571) 272-3781. The examiner can normally be reached on M-Th.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on (571) 272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Hugh Jones/

Primary Examiner, Art Unit 2128